United States Department of the Interior

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Mr. Patrick A. Bauer, P.E.
District Engineer
U.S. Department of Transportation
Federal Highway Administration
Texas Division Office
300 East 8th Street, Room 826
Austin, Texas 78701

2-15-02-F-0589

Dear Mr. Bauer:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed State Highway 21/U.S. Highway 190 (SH 21/US 190) improvements from 0.37 miles east of Democrat Road to 0.1 miles east of the Navasota River Bridge (CSJ 0117-02-028, 0117-03-024, 0117-04-034), located in Brazos and Madison counties, Texas and its effects on the federally listed endangered Navasota ladies'-tresses *(Spiranthes parksii)* in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). Your August 28, 2002, request for formal consultation was received on August 30, 2002.

Another federally listed species is known to occur in Brazos and Madison counties, the threatened bald eagle (*Haliaeetus leucocephalus*). However, appropriate habitat for the bald eagle does not occur within the proposed project area and the nearest known nesting location is 13 miles southeast of the proposed project. The Service does not anticipate impacts to the bald eagle as a result of the proposed road construction activities, therefore this species will not be considered further in this Opinion.

This Opinion is based on information provided in the July 26, 2002, biological assessment and the February 2002 draft SH 21/US 190 - Kurten to North Zulch Environmental Assessment received in our office August 5, 2002. This Opinion is also based on meetings, correspondence and telephone conversations between individuals from the Texas Department of Transportation (TxDOT) Environmental Affairs Division and Bryan District Offices (Jeff Casbeer, Jenise Walton, Ken Holmes, Karen Clary, Mike Carpenter and Chad Bohne) and Service representatives (Kathryn Kennedy, Dianne Lee, Dawn Whitehead, Mary Orms, and Jenny Wilson). A complete administrative record of this consultation is on file at this office.

Consultation History

On July 16, 1999, the Environmental Assessment for the proposed project was submitted to the Service for review. In a September 10, 1999, telephone conversation, Dianne Lee of the Service informed Mike Carpenter of TxDOT that the Service could not comment on the project until the results of the 1999 Navasota ladies'-tresses (NLT) survey by Ms. Kathy Parker were completed and potential habitat presence/absence or impacts were known.

In a November 19, 1999, telephone call, Kathryn Kennedy of the Service asked Karen Clary of TxDOT to delineate Stop M-5 in Kathy Parker's survey report for CSJ 0117-03-024 (Parker 1999) as a Navasota ladies'-tresses habitat site, based on Dr. Kennedy's knowledge of the area.

In a December 23, 1999, letter to the Service, Robert Appleton, P.E., Director of Transportation Planning and Development, Bryan District, provided the following information in response to questions posed by Kathryn Kennedy: There were eight areas of concern on the project and two types of potential Navasota ladies'-tresses habitat - "potential" and "low potential," based on Kathy Parker's surveys (Parker 1999 & 1999a). In addition, TxDOT proposed monitoring of these sites to determine the presence or absence of Navasota ladies'-tresses when favorable blooming seasons occurred until approximately three years after the issuance of a FONSI. If drought conditions persisted and presence or absence could not be determined, then these areas would be considered as low or good potential depending on the habitat quality at the time.

In a March 16, 2000, phone conversation, Dr. Kennedy asked whether Ms. Parker's Navasota ladies'-tresses survey included the entire project and how the acreage amount of potential habitat had been determined. Mike Carpenter replied in a December 21, 2000, email that the acreage of potential habitat was determined by relocating the limits of Ms. Parker's surveys in the field and transferring them to a schematic showing the proposed right of way (ROW). The area of impacted habitat was then calculated between the ditch line and the proposed ROW. Mr. Carpenter also wrote that an additional 2.3 miles (CSJ 0117-04-034), from the center of North Zilch extending east towards Madisonville was added to the project after Ms. Parker had performed her surveys. Mike Carpenter surveyed the additional project area in 2000 and found no potential habitat for the Navasota ladies'-tresses. This change was reflected in the revised February 2000 EA.

In early 2001, the Service determined that surveys for the Navasota ladies'-tresses during 1999 and 2000 would not be adequate because the prolonged drought in the area had made it difficult to find live Navasota ladies'-tresses throughout the known range. In response, TxDOT proposed an alternative approach to determining potential impacts to the plants. The Service would then prepare a biological opinion assuming that potential habitat is occupied and would work with TxDOT to outline acceptable provisions to avoid and minimize impacts to Navasota ladies'-tresses so that the project could proceed in a timely manner. TxDOT also proposed to provide compensation for all potential Navasota ladies'-tresses habitat that might be impacted by the proposed project.

BIOLOGICAL OPINION

Description of the Proposed Action

The SH 21/US 190 provides the only major east-west route north of IH 10 and south of IH 20 connecting the IH 35 and IH 45 corridors in central and east Texas. This roadway is also the designated Military Route connecting Fort Hood in Temple/Killeen and Fort Polk in DeRidder, Louisiana. As a consequence, average daily traffic (ADT) volumes on this roadway have risen steadily to over 6,000 ADT. The current level of service for this two-lane, rural, undivided highway is categorized at type D, or tolerable flow for this roadway. TxDOT predicts that traffic volume for the 20-year design is 10,200 ADT, and that the level of service will quickly deteriorate to undesirable flow if improvements are not made. The proposed facility, a four-lane, rural, divided highway would relieve delay and congestion for SH 21/US 190 from Kurten through the community of North Zilch and address the issue of the relatively high frequency of fatal head-on and cross-traffic collisions between northbound and southbound traffic lanes.

The proposed project begins east of the community of Kurten and ends east of the community of North Zilch, a distance of 15.8 miles. The limits of CSJ 0117-02-028 are 0.8 miles east of Farm-to-Market (FM) 2038 in Kurten to the Brazos/Madison County line. CSJ 0117-04-034 continues to one mile east of FM 39 at North Zilch. CSJ extends from one mile east of FM 39 approximately 2.3 miles to the east and ends 3.17 miles east of FM 39 (Figure 1). This project will receive funds from the Federal Highway Administration.

The planned improvements involve upgrading the existing two-lane roadway to a divided four-lane facility with shoulders. The roadway would consist of four 12-foot wide lanes, 10-foot wide outside shoulders, 4-foot wide inside shoulders, and a 67-foot wide depressed grass median. Four of the seven existing bridges and four of the five existing bridge class culverts will be utilized in the new roadway and the others will be replaced. Twelve new structures adjacent to the existing facilities will also be constructed. The right-of-way required for this section will vary from a typical width of 230 feet to a maximum width of 426 feet in the Navasota River bottom. The proposed horizontal alignment would transition throughout the project, however, in locations of sparse development, property would be acquired mainly to the south of the existing roadway. The horizontal alignment will be designed to minimize the impact on adjacent landowners and on natural land features.

Approximately 301 acres of new ROW will be acquired to complete the proposed project. Residential, commercial, and pasture land comprises 271 acres or approximately 90 percent of the total ROW to be acquired. The other 10 percent of the habitats are composed of twelve wooded areas and numerous areas of fence line vegetation. These habitats total about 28 acres and one acre, respectively. Post oak is the dominant tree species in five of the twelve affected woodland areas and is present in three of the others. The project alignment crosses 18 jurisdictional water crossings and 25 potential wetland areas have been identified. Due to denial of right of entry, the exact area of wetlands to be impacted have not been determined at this time.

Approximately 1.95 acres of the wooded habitats will be preserved within the ROW but outside the construction area/clear zone and 11 acres of bottomland hardwoods will be compensated for utilizing in-lieu fee mitigation at Texas Parks and Wildlife Department's Keechi Creek Wildlife Management Area. In addition, side slopes in the project area will be adjusted wherever possible to avoid impacts to ponds and wetlands and the proposed alignment has been adjusted to maintain the existing side slope in the northwestern side of the existing roadbed to minimize impacts within the Navasota River bottomland habitats. Bridges will also be utilized to minimize placement of fill material within wetlands in this area as well.

Potential Navasota ladies'-tresses habitat occurs within the present and proposed ROW on both sides of the highway in the segments identified as CSJ 0117-02-028 and 0117-03-024 (Parker 1999 & 1999a). Surveys conducted in 1999 by Ms. Kathy Parker, Tejas Ecological Surveys, found 13.91 acres of potentially suitable Navasota ladies'-tresses habitat within the present and proposed ROW although Navasota ladies'-tresses plants have not been found in the project area to date (Figure 1). Mike Carpenter surveyed the third segment of the proposed roadway improvements in 2000 (CSJ 0117-04-034) and found no suitable vegetation, terrain, or soils that would support Navasota ladies'-tresses.

Avoidance of most of the potential habitat in the direct path of the new construction is not possible on this project because these habitats are located on both sides of the existing roadway. Potential Navasota ladies'-tresses habitat within the ROW will become part of the new road and/or the required clear zone adjacent to the roadway (20 feet on either side of the edge of the paved area). Nevertheless, TxDOT proposes to preserve as much potential habitat outside the roadway clear-zone as possible, particularly those areas from the back slope of the roadside ditch to the edge of the ROW. Proposed avoidance measures include retaining as much woody cover and natural topography as possible in areas of potential Navasota ladies'-tresses habitat in order to reduce the degree of habitat fragmentation and minimize edge effects. In addition, revegetation of disturbed areas will be done with native tree and shrub species where feasible and allowed by project plans.

Finally, TxDOT asserts that the cutting of highway back slopes (the area from the center of the ditch line to the right-of-way line) through potential Navasota ladies'-tresses habitat would create areas with the drainage/seepage factors potentially conducive to Navasota ladies'-tresses habitation. TxDOT would monitor these areas before and after construction and if plants are found in these areas in the future, would protect them from disturbance by the placement of barriers and/or protective signing and by monitoring on a regular basis.

A total of 11.13 acres of good potential habitat and 2.78 acres of low potential habitat was identified within the proposed new ROW. TxDOT proposes to compensate for the loss of this habitat through a monetary contribution to the Navasota ladies'-tresses fund administered by the National Fish and Wildlife Foundation (NFWF). This money would be used to fund habitat preservation/conservation in perpetuity through land acquisition for preserves, conservation easements, or other binding agreements for Navasota ladies'-tresses. The monetary amount to be contributed will be calculated using a formula designed to help ensure that an acreage similar to the impacted habitat would be conserved. This formula will be based on fee simple land acquisition costs. TxDOT will multiply the final number of acres impacted by the average value

per acre and add an additional amount (not to exceed 15 percent) to cover indirect costs of land acquisition. Indirect costs to be covered are limited to those directly related to habitat preservation/conservation such as appraisals, legal fees, landowner contact expenses, and the expense of preserve design. To calculate land values, TxDOT will use an average assessed value per acre for undeveloped tracts similar in size to the acreage required for mitigation. TxDOT will obtain the assessed values from the county appraisal districts for Brazos and Madison counties just prior to the year the contribution is to be calculated and paid.

TxDOT proposes providing compensation for losses of good potential Navasota ladies'-tresses habitat at a 1:1 acre ratio replacing one acre of good potential habitat destroyed with one acre of known habitat. Each acre of low potential habitat would be replaced with 0.5 acre of known habitat. An additional 20 percent would be added to the total acreage figure to account for edge effects. Thus, TxDOT proposes to provide compensation for a total of 15.03 acres of Navasota ladies'-tresses habitat: [(11.13 acres good potential habitat + 1/2(2.78 acres low potential habitat)) + 20 percent]. This figure may be modified slightly prior to construction if revisions in the final plans result in an increased or decreased area of impact but should not vary by more than 20 percent of the current amount.

Based upon land costs from the Brazos County and Madison County appraisal districts in 2001 ($5,675 per acre in Brazos County and $2,175 per acre in Madison County), TxDOT estimates the proposed contribution amount to be $82,449.49. The final figure will be calculated the year the contribution is paid and will reflect future changes in average land costs in these counties.

Species Description and Status

Navasota ladies'-tresses

Description

The Navasota ladies'-tresses, a woodland orchid known from 11 counties in central Texas, was federally listed as endangered on May 6, l982 (47 FR 19539), without critical habitat. This orchid is an erect, slender-stemmed perennial that grows 8-15 inches tall. The linear leaves form a rosette, but are absent at the time of flowering. White flowers are arranged spirally on the stalk and have conspicuously white-tipped bracts that appear beneath each flower. Flowers are about one-quarter-of-an-inch long with rounded petals. Side petals have a distinct green stripe and extend past the central petals. The lower central petal is ragged. Buds appear in early to late October, and flowering occurs from mid-October to mid-November.

Life History

NLT occur in a variety of moist sandy soils near drainages, typically from the upper erodible drainage head, extending along the edges of temporary streams to the floodplain of permanent streams. Typical habitat consists of natural openings in upland Post Oak Savanna vegetation (Poole and Riskind l987, Service 1984, Wilson l993). Plants are believed to be situated where subsurface flow or seepage of water occurs seasonally, a common feature in other species of the genus (Arft and Ranker 1995, Kathy Parker, Tejas Environmental Services, pers. comm.). It is

known that the occurrence of claypans beneath the sandy or loamy soils in this area makes these subsurface areas resistant to water percolation, and hence, water tends to travel along these subsurface features toward the dissected drainages typical of the area, providing a relatively dependable moisture source for the orchids. While the Navasota ladies'-tresses occurs in small naturally-created openings in the post oak woodlands, it cannot be regarded as a disturbance species, as it usually occurs in well-developed woodlands and does not colonize extensively disturbed areas. It is rarely found in floodplain forests or open areas dominated by grasses (Wilson 1993).

Navasota ladies'-tresses are extremely slow-growing and long-lived, and individual plants depend on a symbiotic relationship with soil fungi that is established before the seed germinates. The seeds are very small and lack any endosperm, so they are very short-lived and the species does not maintain any appreciable soil seed bank. Rosette leaves support the formation of storage tubers between November and March that sequester resources in preparation for sending up a leafless bloom stalk at some future time. It is believed that plants often require more than one year of photosynthate storage to successfully send up a bloom stalk. If local conditions have not been favorable for forming sufficient below-ground reserves, the plant may not bloom (Wilson l993).

Vegetatively, Navasota ladies'-tresses plants are very hard to discern in their habitat, and therefore, surveys are not recommended except during the blooming season. In addition, this species is very similar to two other species that can occur in the same area. Positive identification can only be made during flowering, and blooming is strongly dependent on adequate moisture the previous April/May and again in August/September (Wilson 1993, Service l984).

Population Dynamics

Pavlik (1996) proposed a method for estimating minimum population sizes needed for viable plant populations by evaluating nine important biological characteristics of the species of interest. Evaluating Navasota ladies'-tresses using this system, the biological characteristics would rank as needing moderate to high population sizes for three of the factors considered, moderate population sizes for three other factors, and low population sizes based on only two of the characters. Ranking the factors on a six point scale from low population size (50) to high population size (2,500), the Service has estimated viable populations for this species may be in the range of 500-800 mature individuals. However, few known population areas approach this number of individuals even when factoring in the plants that are likely present but not blooming. Because of the low numbers of reported individuals, the slow growing nature of the plants, their unusual habitat requirements, and their sensitivity to disturbance and transplanting attempts, the species is not regarded as being very resilient, and, following any disturbance to a population, recovery is expected to be very slow.

Status and Distribution

Navasota ladies'-tresses occur in Brazos, Burleson, Freestone, Fayette, Grimes, Jasper, Leon, Madison, Milam, Robertson, and Washington counties (TXBCD 2001). Currently, approximately 138 sites have been recorded, representing probably 75-80 distinct population

areas predominantly concentrated around southern Brazos County and central Grimes County. Up to 25 percent of the 138 recorded sites, however, are known to have been damaged or destroyed since they were first reported. In fact, over 77 percent (107) of the recorded observations of Navasota ladies'-tresses are either over 10 years old, represent extirpated populations, or are lacking adequate survey information. In addition, in the majority of population areas, fewer than 25 plants were recorded, although not all individuals in a population are necessarily visible above ground in a given year and many of these sites have been visited only once (TXBCD 2001).

The primary threat to Navasota ladies'-tresses is destruction or modification of habitat from urbanization, clearing for agricultural production, or mining (47 **FR** 19539, Service 1984). Destruction of understory by feral pigs is also a problem in some areas. Post oak savannah in many of these counties continues to be converted to bermuda grass pasture. Subsequently, habitat loss continues, particularly in the areas of Brazos and Grimes counties where most sites are located. Mining in Grimes County disturbs more than 7,000 acres every five years (Wilson l993). In addition, the City of College Station in Brazos County is growing rapidly, particularly in the southern and southeastern fringes where most known Navasota ladies'-tresses populations occur.

Navasota ladies'-tresses apparently do not transplant well. In a mining project in Grimes county by Texas Municipal Power Association (TMPA), plants in the impact area were removed and transplanted into an adjacent habitat area. Plant survival has been low at most sites (TMPA l996). Similarly, in an experiment in Lick Creek Park near College Station, Dr. Hugh Wilson planted some seedlings which survived into their second season, but died prior to the third growing season (Wilson l993).

In order to recover the Navasota ladies'-tresses, the Service's goals are to establish and maintain two safe sites through cooperative agreements, purchases, easements, or other means of obtaining management rights. Other needs of the species include the development of a baseline set of ecological data from sites where the species currently exists, and development of public awareness, appreciation, and support for protection and recovery of the Navasota ladies'-tresses (Service 1984).

The following summarizes the occurrence information for the eleven counties in which Navasota ladies'-tresses occurs (all information is from the TxBCD 2001 unless otherwise noted):

Brazos and Grimes counties: Of the 138 total known Navasota ladies'-tresses occurrences, 85 percent were recorded from locations in either Brazos or Grimes counties. Twenty-nine have been reported from Brazos County alone and occur mostly in the southern and central portions of the county. Seven of the twenty-nine recorded observations, however, occur in the northeast corner of the county.

Eleven of the reported occurrences of Navasota ladies'-tresses in Brazos County were recorded without any survey data. Of the remaining eighteen records, four records provide only the years Navasota ladies'-tresses were observed (1946, 1979, 1982, and 1986) and another four records merely report that Navasota ladies'-tresses were documented in 1986. A survey from 1987 reported an occurrence of a large population scattered over the surveyed area and seven

additional records report occurrences of 16, 45, 1,000, 38, 112, 76, and 6 plants from surveys conducted in 1993. In 1995, a survey reported an occurrence of 56 plants. In 2000, the most recently documented occurrence of Navasota ladies'-tresses in Brazos County, 48 plants in three subpopulations were found. The occurrence record documenting 1,000 plants comes from an eight acre site permanently protected by TxDOT as a result of a section 7 consultation on SH 6 south of College Station. No recent survey information is available for this site, however.

Eighty-eight occurrences of Navasota ladies'-tresses have been reported from Grimes County. Of these eighty-eight, seventy-eight occur on the Texas Municipal Power Authority's (TMPA) Gibbons Creek Station lignite mine. Of the ten sites not recorded on the mine site, three occur at Alum Creek, just northwest of the mine, and one occurs in the northwest corner of the county at Democrat Crossing. The Alum Creek sites had 3, 3, and 9 plants, respectively, in a 1984 survey and the Democrat Crossing site had 5 plants in a 1983 survey. The six other sites not found at the mine site occur mostly within close proximity of the TMPA property. Four were surveyed in 1983, however, no plant numbers were recorded. The two other sites were surveyed in 1986 and 1989 with plant numbers recorded as "a few plants," and one plant, respectively.

As a result of earlier mining activities, twenty-eight of the known occurrences on the mine site were extirpated. Those plants that were not destroyed by the mining were transplanted and TMPA agreed, through earlier section 7 consultations on mining activities, to protect five sites for the life of the mine. These sites encompass about 175 acres and the numbers of Navasota ladies'-tresses on the five sites range from a high of 955 plants in 1995 to a low of 36 plants in 1996. Surveys in 2000 found 17 plants with one site not surveyed. These numbers include both transplanted plants and those originally found on these sites. The majority of the remaining sites were surveyed one year each between 1984 and 1994 with plant numbers ranging from 1 to 83 on each site. Several sites were surveyed two or more years but plant numbers did not vary significantly (TXBCD 2001).

Burleson County: Two occurrences of Navasota ladies'-tresses have been recorded. One occurrence was reported to have 80 plants in 1983 and 25 in 1986. The other record represents a population of 73 plants that were transplanted to the area in 1986. While eight plants were observed at this site in 1987, none were found in 1988, 1991, or 1997 surveys.

Fayette County: The only known location of Navasota ladies'-tresses was documented in a 1994 transmission line survey and has not been documented since. One flowering Navasota ladies'-tresses and three flowers that were intermediate between S. parksii and S. cernua were present.

Freestone County: Navasota ladies'-tresses found in this county represent the northernmost extent of the known range for this species. TxBCD documents one occurrence of 28 plants that was observed in Freestone County in 1991. Survey data from the Jewett Mine indicates that three subpopulations of Navasota ladies'-tresses were found within the mine. However, all remaining populations in Freestone County not extirpated during the earlier mining activities will be extirpated as a result of the proposed mining operations in the Permit 47 Area of the Jewett Mine (consultation # 2-15-02-F-0214).

Leon County: One occurrence of 13 Navasota ladies'-tresses was reported in 1987. An

additional record was reported in 1986, although this occurrence is questionable.

Jasper County: Two occurrences of Navasota ladies'-tresses have been recorded. One of these records represents two plants observed in 1996, while the other represents one flowering plant and six sterile plants observed in 1997.

Madison County: Two records have been reported from this county about 11 miles east of the proposed project boundaries. One of these occurrences was reported in 1987, but survey data is lacking for both of these sightings.

Milam County: Only one record of Navasota ladies'-tresses exists. There were three plants observed there in 1993 but there are no records of subsequent surveys for Navasota ladies'-tresses in this county.

Robertson County: Seven occurrences of Navasota ladies'-tresses have been reported, however, survey data were not available for three of these records. Of the other four records, one occurrence was reported as three plants found in a 1983 survey, another was recorded as 3 plants from a 1997 survey, a third was recorded as one plant from a 1997 survey, and one was recorded as two subpopulations containing a total of 11 plants from a 1997 survey.

Washington County: Two sightings of Navasota ladies'-tresses have been recorded, however, one of these records has no survey data associated with it, and the other represents a population of 19 plants that were transplanted to the area in 1986. Two plants were observed at the transplant site in 1988 and none were found in surveys conducted in 1991 and 1999.

Analysis of the Species/Critical Habitat to be Affected

The proposed project would not impact any known Navasota ladies'-tresses, however, it would impact over 14 acres of potential habitat within the range of the species. Five sites, with good potential to support Navasota ladies'-tresses, and three sites, with a smaller potential would be impacted by the proposed road widening. The average acreage of the eight sites to be impacted is 1.74 acres with actual sizes ranging from 0.71 to 3.16 acres.

Drought conditions prevalent in Brazos County since 1997 have hampered attempts to find Navasota ladies'-tresses, since low moisture conditions prevent the plants from producing visible growth in the fall. Consequently, in order to move the project forward despite Navasota ladies'-tresses presence not being confirmed by positive identification within the ROW, TxDOT assumes that suitable habitat within the proposed project area contains Navasota ladies'-tresses and will avoid and minimize impacts to this habitat to the extent possible.

TxDOT has proposed to compensate for the loss of Navasota ladies'-tresses habitat as a result of the road construction activities by contributing to the Navasota ladies'-tresses fund as a conservation measure to aid in recovery of the species throughout its range.

Environmental Baseline

Status of the Species Within the Action Area

The Service considers the action area to be the area within the ROW and an additional 100 feet on either side to account for edge effects. Although the status of Navasota ladies'-tresses within the project area is unknown, records from the Texas Parks and Wildlife show that Navasota ladies'-tresses have been found near, but not within, the present project limits (TXBCD 2001). Eight distinct Navasota ladies'-tresses populations have been located in the upland drainages within 0.5 miles to 8 miles of both sides of the project area.

Although unable to conduct adequate surveys for individual plants due to drought conditions present in the project area, TxDOT identified 11.4 acres of habitat within the proposed ROW that exhibited a good potential for supporting Navasota ladies'-tresses. Habitat suitability was judged by soil texture, appropriate vegetative cover, canopy density, proximity to drainages, land use practices, and severity of grazing pressure. Areas were judged to have good potential if they had (1) permeable surface soils overlaying an impermeable clay layer, (2) post oak woodlands with sparse canopies or woodland edges, and (3) a significant component of native herbaceous vegetation. Proximity to small drainages and eroded gullies was considered to be a positive factor. Areas with minimal deviance from these characteristics were also considered to have good potential as habitat.

TxDOT also identified 2.78 acres of habitat that had the necessary soil and vegetative contexts to support Navasota ladies'-tresses but had been impacted by human activities such as grazing, quarrying, farming, private road construction, home building, and other land use practices. These areas were considered somewhat less likely to support extant populations of Navasota ladies'-tresses and thus were designated low potential habitat.

Factors Affecting Species Environment Within the Action Area

HABITAT AND SOILS

The project is located in the Texas Post Oak/Savanna Ecological Area. The natural vegetation is characterized by a mosaic of upland and dense post oak woodland interspersed with open, grassy savanna (McMahan, Frye and Brown, 1984). The dominant tree species are post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*). The dominant understory plant is yaupon (*Ilex vomitoria*) with occasional farkleberry (*Vaccinium arboreum*) and roughleaf dogwood (*Cornus drummondii*). Wooded areas have canopies of 50-70 percent and tree height ranges between 30-45 feet (9.1-13.7 meters). The riparian forests contain stands of river birch, elm, and hackberry. The grasslands along the project area contain a mixture of native and introduced grasses which are regularly mowed and maintained. The surrounding terrain is gently sloping to level. Soil types include the Tabor-Lufkin Association in Brazos County and the Crockett-Lufkin-Axtell Association in Madison County. These soils are characterized by a very hard, very fine sandy loam surface over a mottled yellow and gray, strongly acid, clayey subsoil.

LAND USE

Land use surrounding this project is 10 percent urban and 90 percent rural. The urban area includes residences and commercial establishments. The rural area is mainly undeveloped pastureland and dense wooded areas.

The most pressing threats in the vicinity of the proposed project area are (1) rapid urban growth south of College Station, 10 miles south of the project area, and (2) mining activities in central Grimes County, approximately 15 miles south of the project area. Post oak woodland is considered prime acreage for housing developments, and sales of large tracts of land slated for residential and commercial development are taking place throughout the area. In 1997, Bryan-College Station was ranked the fifth fastest growing American city (Kiplinger's Personal Finance Magazine). Between 1980 and 1999, the population increased by 57 percent (Bryan-College Station Economic Development Board 2001). Presently, most of the urban growth is occurring on the south side of College Station because of the area's proximity to Texas A&M University and associated economic enterprises. However, as the economy of the Bryan-College Station area grows, land to the north and east of the metro area, and along SH 21/US 190, may also be developed.

PREVIOUS CONSULTATIONS

Although there have been no section 7 consultations within 10 miles of the action area, three projects have affected the Brazos and Grimes County populations of Navasota ladies'-tresses. SH 6 from north of Alum Creek to FM 159 caused the loss of approximately 33 acres of post oak habitat and 9 known Navasota ladies'-tresses plants. As compensation for these losses, TxDOT purchased a conservation easement over eight acres of known Navasota ladies'-tresses habitat near the Texas Speedway. Although at one time Navasota ladies'-tresses plants on this site numbered as many as 1,000 individuals (TXBCD 2001), no recent information is available as to the number of Navasota ladies'-tresses present at this time.

Construction of SH 40 from FM 2154 near S. Graham Rd to SH 6 at Greens Prairie Rd, approximately 16 miles to the south of the proposed project area, resulted in the loss of an estimated 11 Navasota ladies'-tresses plants. An additional 5 known Navasota ladies'-tresses and 40 uncertain rosettes within the ROW for SH 40 were expected to decline due to potential changes in site hydrology and nearby earth disturbance activities. As compensation for impacts from SH 40, TxDOT purchased a 38-acre conservation easement along a tributary of Spring Creek with the goal of protecting a minimum of 33 plants. A total of 56 plants were known to exist on this site at the time of purchase, however, the current status of the area is unknown at this time. TxDOT also preserved the area containing the 40 identified rosettes as a part of the proposed project.

As discussed earlier, mining activities at TMPA's Gibbons Creek Station resulted in the loss of twenty-eight of the known occurrences on the mine site. Those plants that were not destroyed by the mining were transplanted and TMPA protected five sites for the life of the mine. These sites encompass about 175 acres, and the numbers of Navasota ladies'-tresses on the five sites range from a high of 955 plants in 1995 to a low of 36 plants in 1996. Surveys in 2000 found only 17 plants with one site not surveyed.

Effects of the Action

The project will eliminate 15.03 acres of potentially suitable Navasota ladies'-tresses habitat (11.4 acres of good potential habitat and 2.78 acres of low potential habitat plus an additional 20 percent added to account for edge effects) in eight separate areas. In addition, the proposed project will continue to add to the gradual sustained loss of post oak woodland in the area and to Navasota ladies'-tresses habitat fragmentation. These impacts are likely permanent for Navasota ladies'-tresses due to changes in subsurface hydrology. Further habitat degradation may be caused by secondary effects associated with increased industrialization and rapid urban growth resulting from economic stimulation (USFWS 1979).

TxDOT's proposal to contribute to the Navasota ladies'-tresses Conservation Fund will have a beneficial effect on the species, regionally, as lands are purchased or protected from alteration through use of these funds.

Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Habitat destruction as a result of the proposed activity was evaluated. Other more indirect cumulative effects are largely unquantifiable. However, the following examination of activities and trends in the area document an expected overall increase in activities that result in fragmentation, degradation, and loss of significant habitat areas that currently exist in Brazos and Grimes counties.

The primary threat to Navasota ladies'-tresses throughout its range is destruction or modification of habitat from urbanization, clearing for agricultural production, or mining (47 **FR** 19539, Service 1995 and 1984b). Destruction of woodland understory by feral pigs is also a problem in some areas. Almost 30 known sites have been lost in the last ten years to lignite mining and many others fragmented or otherwise impacted by urbanization. Post oak savanna in the counties occupied by the Navasota ladies'-tresses continues to be converted to Bermuda grass pastures. Subsequently, habitat loss continues, particularly in the areas of Brazos and Grimes counties where most sites are located. Mining in Grimes County disturbs more than 7,000 acres every five years (Wilson 1993).

According to the 1997 U.S. Agriculture Census, agriculture continues to be a vital part of the economy of the Brazos Valley. Approximately 70 percent of the land area is devoted to agriculture. Primary crops include cow/calf production, cotton, poultry, corn, hay, sorghum, and milk (Bryan-College Station Economic Development Corporation (BCSEDC) 2001). Livestock and hay production activities are expected to cause continuation of a current trend to clear post oak woodlands and convert them to Bermuda grass pastures. Droughts in Texas depress cattle markets and herd sizes temporarily, but recovery of these markets with the return of the rains puts increased pressures on range and pasture lands. Conversely, droughts increase the demand for hay statewide and associated increases in prices for hay increase the demand for more high-

yielding pastures. Consequently, various climatic driven market conditions support the conversion of additional woodland to hayfields and/or pastures, as well as the increased use of herbicides and seeding with exotic species. All of these practices aggravate habitat fragmentation and cause detrimental changes in community structure for Navasota ladies'-tresses (Navasota ladies'-tresses monitoring data, Kathryn Kennedy, Service, pers. comm.).

According to the Texas State Data Center, the Bryan-College Station community has experienced about a 57 percent increase in population from 1980 to 2000. According to the BCSEDC (2001), the single-family residential market in the Bryan-College Station area is growing. A total of 701 residential building permits were issued in 1999, and from January to November of 2000, 650 permits were issued. The housing market in Bryan-College Station continues to show the benefits of an expanding economy and continued population growth. In addition, an apartment shortage is not expected for the next 24 months due to a 23 percent increase in the number of multi-family units from 1990 to the end of 1999.

The office building market in Bryan-College Station remains relatively stable in spite of a large over-supply brought about by record-breaking construction of new space during the early 1980s (BCSEDC 2001). The market has remained stable since 1990 in terms of net leasable and occupied area. New office building construction has occurred over the past six years, mostly in southern College Station, bringing the net leasable space to over 1.1 million square feet. In 2000, the Bryan-College Station office market occupancy rate increased by 8.7 percent over the 1999 occupancy rate.

CONCLUSION

After reviewing the current status of the Navasota ladies'-tresses, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the Navasota ladies'-tresses. No critical habitat has been designated for the Navasota ladies'-tresses, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 9 of the Act, and Federal regulations pursuant to Section 4(d) of the Act prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

As discussed above, Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants is provided to the extent that the Act prohibits the removal and reduction to possession of Federal listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the removal, cutting, digging, damage, or destruction of endangered plants on non-Federal areas in violation of any State law or regulation or in the course of any violation of a State criminal trespass law.

Amount or Extent of Take Anticipated

The Service does not anticipate the proposed action will incidentally take any listed animal species.

Effect of the Take

No take of any listed animal species is anticipated as a result of this proposed action.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends implementing the following actions:

I. Minimize the risk of destruction or harm to Navasota ladies'-tresses plants from direct application of herbicides, herbicide drift into adjacent areas, or through reduction in available pollinators. This would be accomplished by avoiding use of herbicides and pesticides in habitats which could potentially support Navasota ladies'-tresses, particularly in wooded areas of the ROW and during time periods when the Navasota ladies'-tresses are above ground. In addition, in areas where herbicide use cannot be avoided, direct application techniques should be used to minimize amount of application and the total area of impacted habitat.

II. Encourage and participate in additional Navasota ladies'-tresses research and recovery activities.

In order for the Austin Fish and Wildlife Office to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

Re-initiation-Closing Statement

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Sec. 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the

agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this Opinion, please contact Jenny Wilson at (512) 490-0057, extension 231.

Sincerely,

Robert T. Pine
Supervisor

cc: Texas Department of Transportation, Environmental Affairs Division, Austin, Texas

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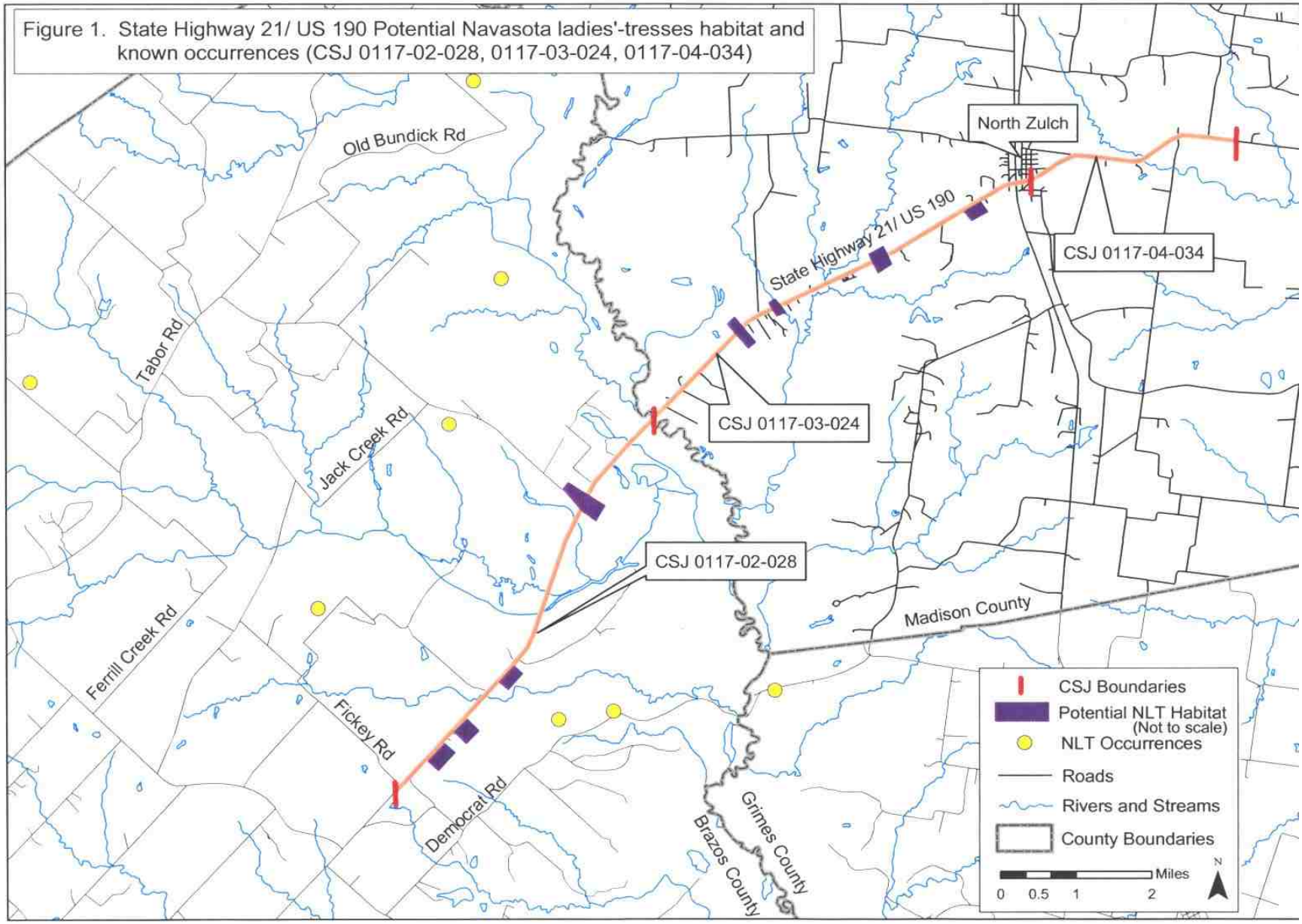
Figure 1. State Highway 21/ US 190 Potential Navasota ladies'-tresses habitat and known occurrences (CSJ 0117-02-028, 0117-03-024, 0117-04-034)
Old Bundick Rd
North Zulch
State Highway 21/ US 190
CSJ 0117-04-034
Tabor Rd
Jack Creek Rd
CSJ 0117-03-024
CSJ 0117-02-028
Madison County
Ferrill Creek Rd
Fickey Rd
Democrat Rd
Brazos County
Grimes County
CSJ Boundaries
Potential NLT Habitat
(Not to scale)
NLT Occurrences
Roads
Rivers and Streams
County Boundaries
Miles
0 0.5 1 2
N